# ROTATIONAL SPECTRA, HYPERFINE STRUCTURE, AND NUCLEAR MAGNETIC SHIELDING TENSORS OF $^{33}SO_2$ AND $SO^{17}O$

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Precise frequencies for the $1_{11} - 2_{02}$ transition of $^{33}SO_2$ and $SO^{17}O$ in natural isotopic abundance have been obtained by microwave Fourier transform spectroscopy to yield improved hyperfine constants. Nuclear spin-rotation coupling constants have been determined for $^{33}SO_2$ for the first time. The same transition was also recorded for $^{32}SO_2$, $^{34}SO_2$, $SO^{18}O$, and vibrationally excited ($v_2 = 1$) $^{32}SO_2$, in part to allow for a comparison with previously published precise data.

$SO_2$ is an important interstellar molecule. Continuing our investigations of the rotational spectra of isotopomers of $SO_2$,[a,b] selected $SO^{17}O$ transitions have been studied in the submillimeter wave region in order to improve and newly determine rotational and centrifugal distortion constants. At present, these measurements cover 540 – 840 GHz with $J$ and $K_a$ up to 63 and 16, respectively. For $^{33}SO_2$, some transitions with large hyperfine splitting were recorded in the millimeter wave region.

The spin-rotation constants have been used to derive nuclear magnetic shielding parameters which were compared with NMR shifts, data from quantum chemical calculations, and results for the isoelectronic $O_3$ molecule.

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[a] E. Klisch, P. Schilke, S. P. Belov, and G. Winnewisser, *J. Mol. Spectrosc.* **186** (1997) 314.

[b] S. P. Belov, M. Y. Tretyakov, I. N. Kozin, E. Klisch, G. Winnewisser, W. J. Lafferty, and J.-M. Flaud, *J. Mol. Spectrosc.* **191** (1998) 17.